ME-126

OPERATING INSTRUCTION MANUAL

CAL LAB

Telonic®

ML 120

MODEL HN-3

4158 TO SERIAL # 4165

SWEEP GENERATOR

050

Telonic INDUSTRIES, INC. BEECH GROVE, INDIANA

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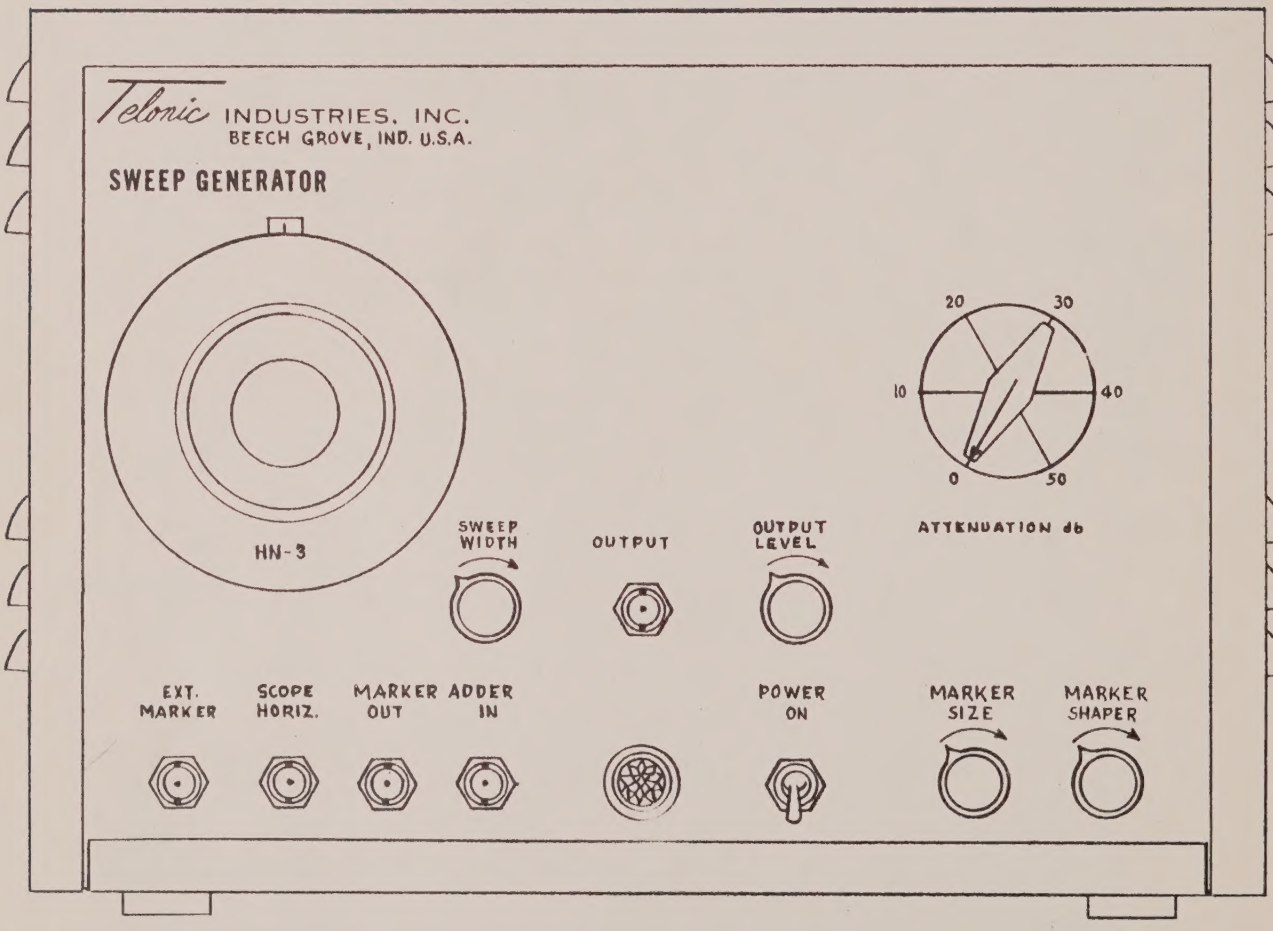
SPECIFICATIONS

MODEL HN-3 SWEEP GENERATOR

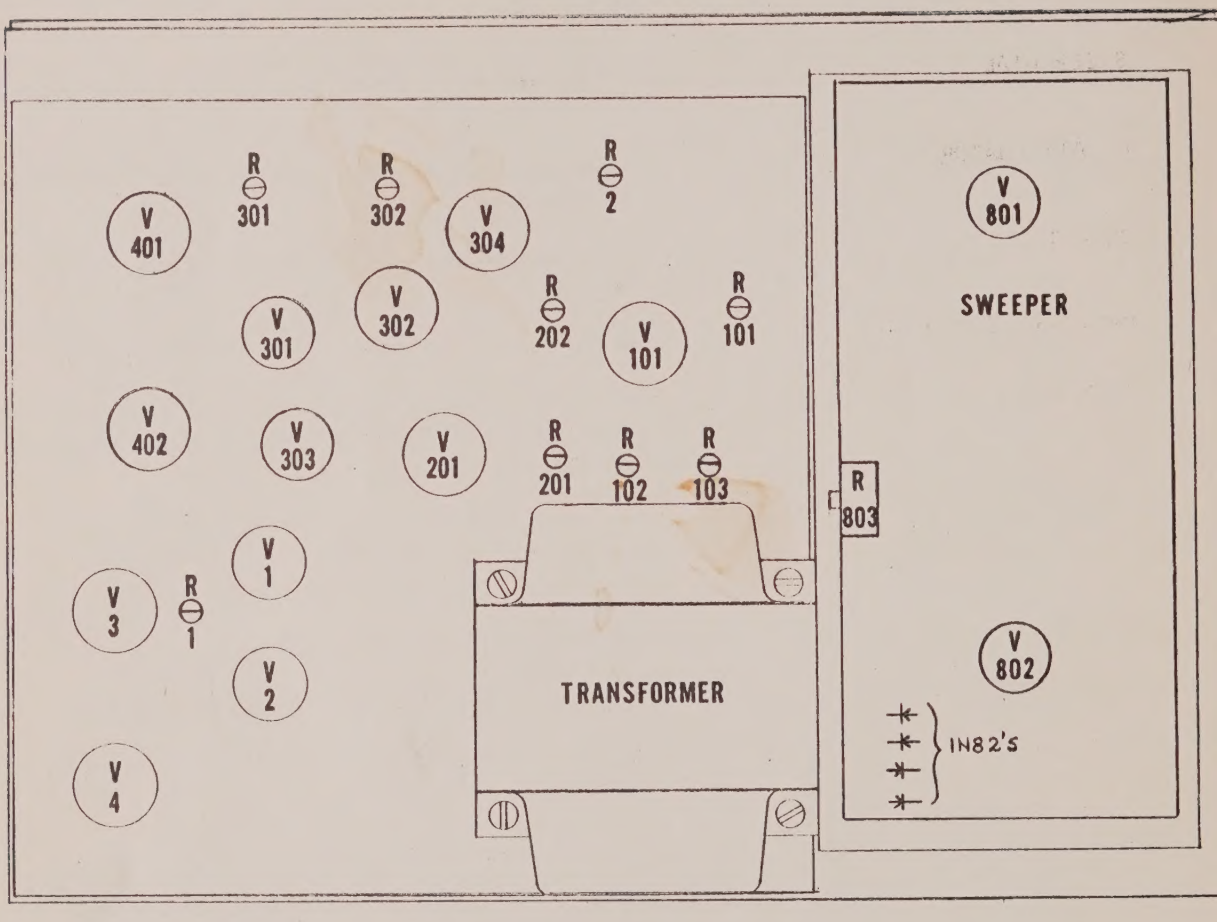
CENTER FREQUENCY	.5 to 200 MC
FREQUENCY RANGE	.5 to 300 MC
SWEEP WIDTH	±200 KC to ±200 MC
OUTPUT	
Voltage	.75 volts peak to peak.
Impedance	50 ohms.
Flatness	± 5% over maximum sweep width.
ATTENUATION	
Step	0, 10, 20, 30, 40, 50 db.
Vernier	0 to over 10 db..
DISPLAY LINEARITY	Normally below 1.2:1.
RADIATION	Less than 10 microvolts.
SWEEP RATE	Line Frequency (50/60 cps.)
BLANKING	Sweep Oscillator is turned off for one half of its cycle to provide a Zero Base Line
SCOPE HORIZONTAL SWEEP	Approximately 20 volts peak to peak.
SOURCE VSWR	Normally below 1.2:1.
POWER	115 V. 50/60 cps. Approximately 100 watts.
EXTERNAL MARKER INPUT	An external CW signal of approximately 0.1 volts may be used to produce a "birdy" type marker.
MARKER SYSTEM DESCRIPTION	The external marker signal is mixed with a sample of the sweep signal to produce a beatnote or birdy. This birdy is amplified and superimposed upon the detected RF output signal before it is applied to the scope vertical input. Amplitude and width of the marker is adjustable over a wide range.
PHYSICAL DESCRIPTION	Portable style 10" x 14" x 10".


Telonic INDUSTRIES, INC.
BEECH GROVE, IND. U.S.A.
SWEEP GENERATOR
HN-3
20
30
10
40
0
50
ATTENUATION db
SWEEP WIDTH
OUTPUT
OUTPUT LEVEL
EXT. MARKER
SCOPE HORIZ.
MARKER OUT
ADDER IN
POWER ON
MARKER SIZE
MARKER SHAPER

DESCRIPTION OF FRONT PANEL

SWEEP DIAL	Indicates center frequency of the sweep oscillator at minimum sweep width.
RF ATTENUATOR	Turret Attenuator provides indicated amounts of attenuation.
OUTPUT	RF sweep output - BNC Connector - Impedance 50 ohms.
EXTERNAL MARKER	Marker input for external signal source.
SWEEP WIDTH	Varies the amount of voltage supplied to the vibrating capacitor and can be used to vary the sweep width.
OUTPUT LEVEL	Determins the average B+ supplied to the sweep oscillator and may be used as a vernier level control.
POWER ON	Switches AC power ON and OFF.
MARKER SHAPER	Varies the width of the marker signals.
MARKER SIZE	Varies the amplitude of the external marker signals.
MARKER ADDER	
IN	The demodulated signal from the device being tested is fed into this connector so that marker signals may be superimposed.
OUT	This connector should be connected to the vertical input terminals of the scope for viewing the demodulated signal and markers.
SCOPE HORIZONTAL	This connector should be connected to the scope horizontal amplifier input.

CHASSIS LAYOUT

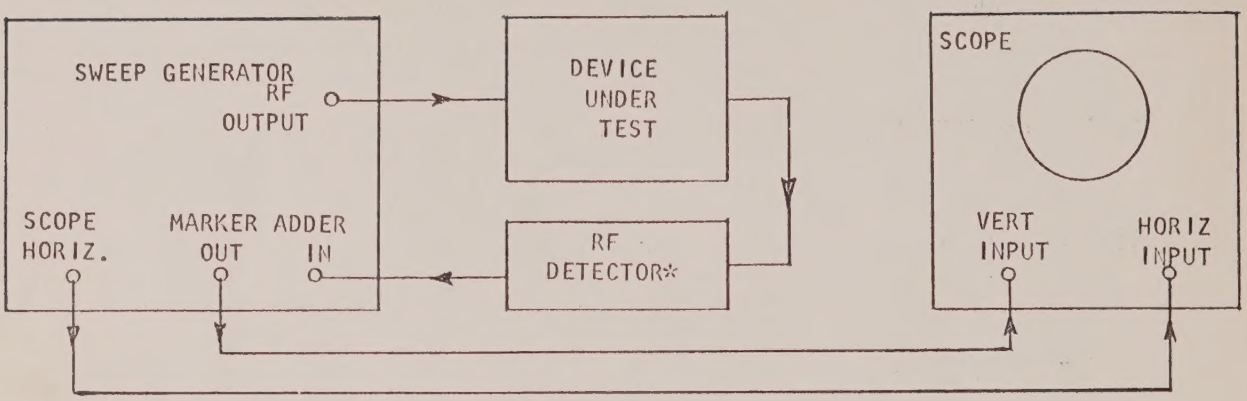


V1	5651
V2	6AU6
V3	EL84/6BQ5
V4	EL84/6BQ5
V101	12AX7
V201	12AX7
V301	6AU6
V302	12AX7
V303	6AU6
V304	EL84/6BQ5
V401	12AX7
V402	12AX7
V801	6AF4
V802	6AF4

DESCRIPTION OF CHASSIS CONTROLS

R1 - B+ ADJUST	This control varies the bias on the amplifier, (V2), for the B+ regulator, (V3), and is adjusted to produce a regulated B+ voltage (B+2) of 175 volts.
R101 - HORIZONTAL PHASE	This control adjusts the phase of the scope horizontal sweep voltage with reference to the phase of the sweep oscillator.
R102 - LINEARITY	This control can be used to change the waveform of scope horizontal output (V101). It is normally set for best linearity at maximum sweep width.
R103 - HORIZONTAL SIZE	This control adjusts the size of the horizontal output when the Front Panel SWEEP WIDTH control is set to its maximum position. It is adjusted to maintain a constant horizontal size at all sweep width settings.
R201 - BLANKING PHASE	This control adjusts the phase of the blanking pulse with reference to the phase of the sweep oscillator.
R202 - BLANKING WIDTH	This control is the grid resistor for the blanking pulse generator (V201). It is adjusted to blank one-half of the sweep cycle to produce a zero base line.
R301 - LEVEL MAXIMUM	This control is used to adjust the output level when the front panel LEVEL control is at its maximum position.
R302 - LEVEL MINIMUM	This control is used to adjust the output level when the front panel LEVEL control is at its minimum position.
R2 - SWEEP WIDTH LIMIT (HI FREQ. SIDE OF DISPLAY) R803 - SWEEP WIDTH LIMIT (LO FREQ. SIDE OF DISPLAY)	These limit controls determine the voltage supplied to the front panel sweep width dual potentiometer and are used to adjust the sweep width when the front panel control is set to maximum. The two sweep oscillators are operating out of phase with each other and the nonlinearities present at such wide sweeps cancel out. Thus the two limit controls are set not only to provide full sweep width but are also set for best display linearity. R2 affects primarily the high frequency side of the display and R803 affects primarily the low frequency side of the display.

OPERATING INSTRUCTION



TYPICAL SET UP - The following procedure is recommended for setting up this instrument in test position.

1. Connect unit to proper power line voltage and turn POWER ON switch to ON position.

2. Make connections to the scope, the device under test, and RF Detector as shown above. All connectors located on the sweep generator are BNC type and it is recommended that RG cable be used for all connections. This insures good ground connection between each device, minimizes hum, leakage from unit and pick up of spurious external signals. The cable that is used to connect the RF OUTPUT to the device under test should match the impedance of the sweep generator. If the input impedance of the device under test is different from the impedance of the sweep generator, a matching network should be used to insure a constant input signal.

3. Adjust the RF output level by means of the OUTPUT LEVEL control and the step RF ATTENUATOR to the proper input signal for the device being tested. Failure to do this will result in a misleading scope pattern.

4. Adjust the SWEEP WIDTH control and center frequency SWEEP DIAL to cover the desired frequency range.

5. MARKERS
   Markers may be produced by one or more of the following methods depending on the specific unit.
   A. Plug-in crystal markers (C type).
   B. Plug-in crystal harmonic markers (CDH or CH type).
   C. Internal variable marker.
   D. External C.W. Signal.
   First turn on marker unit or inject external C.W. signal and adjust MARKER SIZE and SHAPER until markers are of a convenient size and width.

*See Telonic literature for detector recommended for use with this instrument.

INTERNAL CONTROL ADJUSTMENT

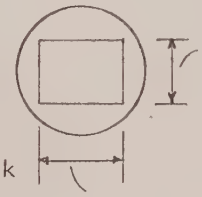
PRINTED WIRING BOARD CONTROLS are adjusted at the factory and normally do not require any readjustment. However, should it be desirable to check these adjustments, follow these steps.

1. Connect unit as shown under operating instructions but omit the device under test. The recommended detector for the unit is the Telonic XD-3. Turn unit on.

2. B+2 ADJUSTMENT: Adjust R1 to provide a regulated B+ voltage of 175 volts (blue wire).

3. BLANKING PHASE and WIDTH ADJUSTMENTS: Set SWEEP WIDTH control to its maximum counter-clockwise position; OUTPUT LEVEL control to its maximum clockwise position and the Attenuator to its 0 db. position. A rectangular pattern should appear on the scope.

   Adjust SCOPE VERTICAL and HORIZONTAL SENSITIVITY controls to present a pattern as shown. Vertical amplifier should be DC coupled, pattern will deflect up or down depending on output polarity of the RF Detector. Patterns shown with Telonic XD-3 half-wave detector with negative output.



   A vertical line indicates no horizontal output, first check scope and connecting cables, then trouble shoot horizontal sweep section.

   A horizontal line with zero amplitude indicates no RF Output. First check scope, RF Detector and connecting cables. Adjust R301 (see Step 4). Refer to Maintenance Page 13.

   A horizontal line deflected below zero indicates no blanking. Trouble shoot the blanking generator.

   If pattern is not rectangular, adjust BLANKING PHASE and WIDTH controls R201, and R202.

4. RF OUTPUT MIN and MAX ADJUSTMENTS: Adjust LEVEL MAXIMUM control R301 until vertical height of the pattern equals $\frac{1}{2}$ of the peak to peak RF output voltage shown on the specifications sheet, Page 1. Since the RF Detector is approximately 90% efficient, the actual RF output voltage will be slightly higher than the voltage shown on the scope. Turn turret attenuator to 10 db. position and record the height of the pattern. Return the turret attenuator to the 0 db. position. Turn the RF OUTPUT LEVEL control to its maximum counter-clockwise position and adjust LEVEL MINIMUM control, R302, until the height of the pattern is slightly less than it was with 10 db. inserted in the output circuit. This procedure insures that the OUTPUT LEVEL control will provide over 10 db. of vernier attenuation. An alternate method to perform the above adjustments is to use a RF power meter in place of the RF Detector. Keep in mind that the sweep oscillator is blanked off for $\frac{1}{2}$ of each cycle, therefore, the reading on the power meter will have to be doubled to obtain the actual RF output power.

INTERNAL CONTROL ADJUSTMENT
(Continued)

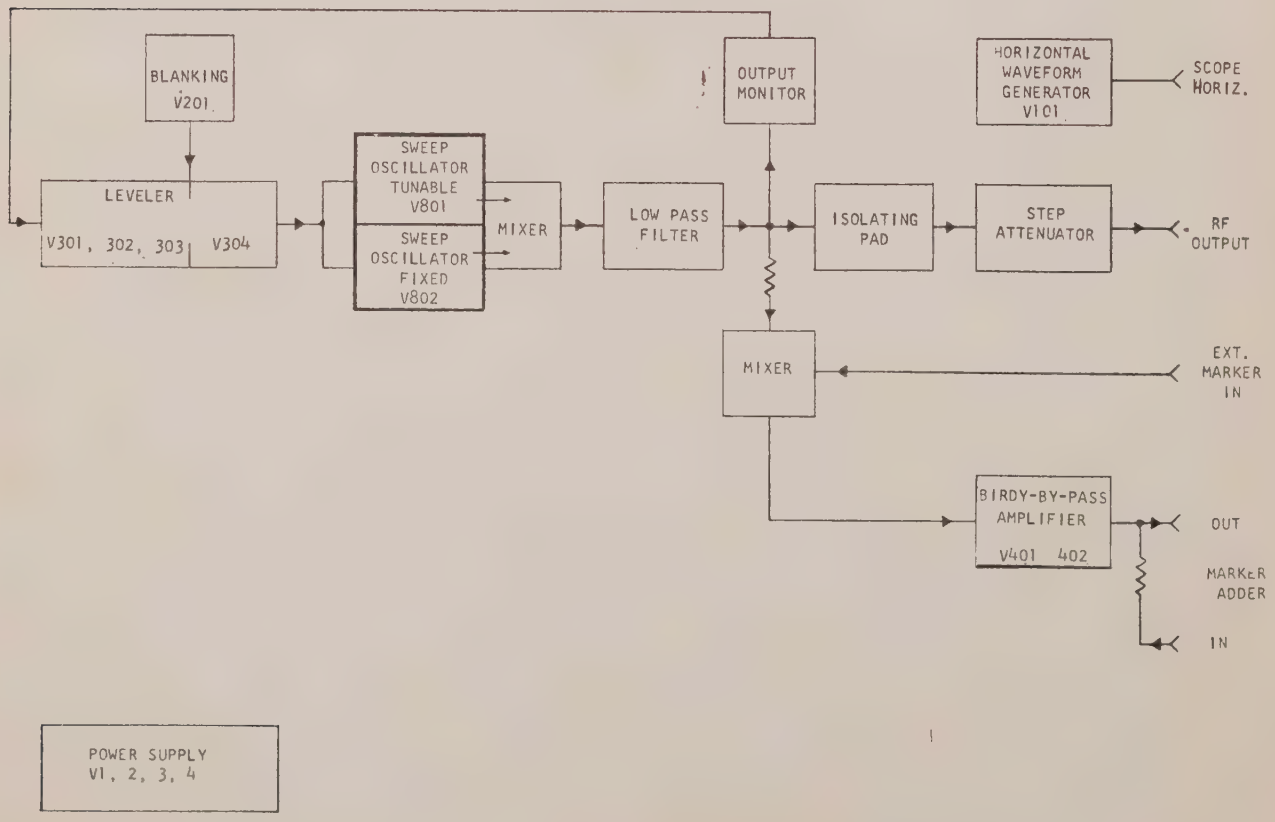
5. HORIZONTAL PHASE and SIZE ADJUSTMENTS: Return OUTPUT LEVEL control to maximum clockwise position. Set SWEEP WIDTH control to its maximum clockwise position. If pattern is not rectangular, adjust HORIZONTAL PHASE, R101, until a rectangular pattern is obtained. If Horizontal Size has increased or decreased adjust HORIZONTAL SIZE, R103, until pattern has the same horizontal size as it had with the SWEEP WIDTH control in its counter clockwise position.

MARKERS MUST BE PROVIDED FOR THE FOLLOWING ADJUSTMENTS

6. SWEEP WIDTH ADJUSTMENT: With the sweep dial set to a center frequency of 200 MC R2 is adjusted so that the highest frequency obtained on the display is 300 MC. R803 is next adjusted so that the lowest frequency present on the display is 100 MC.

7. LINEARITY ADJUSTMENT: Linearity may best be adjusted when a number of markers are present on the display. In the factory a harmonic generator is used for this purpose. The LINEARITY control, R102, is adjusted for equal spacing between the markers. The HORIZONTAL PHASE control also has an effect on Linearity and can be adjusted slightly to obtain optimum linearity.

BLOCK DIAGRAM



SWEEP OSCILLATOR

The sweep output is produced by the heterodyne method which combines the output of a tunable Sweep Oscillator with a second fixed tuned sweep oscillator. These two sweep oscillators are swept 180° out of phase which accounts for the wide sweep width since the sweep width of each sweep oscillator is added in the heterodyne output. This method of sweeping also produces excellent linearity since the non-linearities of each sweep oscillator are canceled in the heterodyne output.

Four diodes in a bridge circuit produce the mixing of the two fundamental frequencies and due to the balanced nature of this mixer, a high output is produced with a minimum of harmonic or spurious content. A low pass filter removes the fundamental frequencies and allows the output or heterodyne frequencies to pass out through the monitor and attenuator to the final output. The oscillator circuits are similar and have similar frequency versus voltage or frequency versus temperature effects to minimize drifts.

BLANKING CIRCUIT

The purpose of the blanking circuit is to produce a zero base line by removing B+ from the Sweep Oscillator during the sweep retrace. The blanking voltage is originated by a square wave producing circuit. A phased 6.3 volt sinewave is squared and amplified by the blanking tube. This square wave output of V201 controls V304 (EL84), the sweep oscillator voltage regulator tube, and thus deprives the Sweep Oscillator of voltage during one-half of each cycle. PHASE and WIDTH controls are provided for adjusting this blanking voltage to coincide with the horizontal and sweep drive signals.

AUTOMATIC OUTPUT LEVELING CIRCUITRY

A sample of the sweep oscillator output is detected by the monitor diode, located in the monitor block. This detected signal is then amplified and used to control the plate voltage of the sweep oscillator. The OUTPUT LEVEL control adjusts the bias on the first stage of the amplifier. This causes the DC levels in the entire amplifier to change, and varies the average B+ supplied to the sweep oscillator from a minimum of 25V to over 100V. A small decrease in the sampling voltage causes a large increase in the B+ supplied to the sweep oscillator, and thus counteracts any amplitude variation as the oscillator is tuned over the range.

The operation of this circuit and of the sweep oscillator can be checked at Pin 1 of V301. The waveform at this point will normally show a flat output level over the entire band. Adjusting the OUTPUT LEVEL will change this level.

To replace the monitor diode, remove the insulated holding screw in the monitor block and then remove diode from the block.

HORIZONTAL SWEEP OUTPUT CIRCUITRY

The sawtooth voltage for the scope horizontal sweep is produced by V101. A phased 6.3 volt sinewave is applied to the grid of one of the triode sections of V101. The tube then clips and amplifies the grid signal so that a square wave is produced at the plate. This square wave is then shaped by a RC network in the plate circuit to produce a linear sawtooth voltage. A potentiometer in this circuit allows the linearity of the waveform to be adjusted. This sawtooth voltage is then applied to the second triode section of V101, which is connected as a cathode follower. The output from the cathode follower is then applied to the Scope Horizontal Amplifier and compensates for the slight nonlinear characteristics of the vibrating sweep capacitor at high sweep widths. At sweep widths from minimum to about 50%, the vibrating sweep capacitor is quite linear. In order to maintain almost perfect linearity for all values of sweep width, a potentiometer is ganged with the sweep width potentiometer which automatically changes the scope horizontal sweep voltage from a sinusoidal waveform at low sweep width settings to a linear sawtooth waveform at the high sweep width settings.

POWER SUPPLY

The power transformer output of 140 volts AC is fed into a half wave voltage doubler using silicon rectifying elements CR1 and CR2. B+ is taken off the capacity input filter to provide +375 volts unregulated to the plates of V3, (B+ Regulator Pass Tube), V304 (Oscillator Pass Tube), and V4 (Marker B+ Pass Tube).

B+2 is the output of the electronic regulator circuit, consisting of V2 and V3, and provides +175 volts regulated. Potentiometer R1 controls the operating point of V2, regulator amplifier, and is set for proper B+2 output voltage.

B+3 is obtained by biasing the grid of V4 at approximately 85 volts positive, which causes current to flow through cathode resistor R20. The voltage at Pin 3, V4, is supplied to the Plug-In Markers and maintains its regulation due to the low impedance characteristics of the cathode follower circuit and provides approximately 100 volts.

The B- voltage is obtained by the half wave Silicon rectifier CR3. Regulator tube V1 maintains this voltage at -82 volts, and supplies bias voltage to the leveler circuit as well as a reference voltage for the electronic regulator.

Resistor R4 acts as a fuse, protecting the transformer and rectifiers from overload.

The primary of the power transformer is normally wired for 115 volt AC line operation. However, it can be converted to operate from a 230 volt AC source if desired. This conversion is described in the maintenance section.

MARKER SYSTEM DESCRIPTION

GENERAL

A sample of the sweep signal is mixed with the external marker signal to produce beatnotes or birdies. These birdies are then amplified and superimposed upon the demodulated swept signal and applied to the vertical amplifier of the oscilloscope. The size and shape of the marker may be varied over a wide range by the size and shaper control of the birdy amplifier.

EXTERNAL MARKER INPUT

The CW signal from the external marker input is fed into a diode mixer, where it is mixed with a sample of the sweep signal to produce birdies. The resultant birdy is then fed into the birdy-by-pass amplifier.

MAINTENANCE

POWER SUPPLY: Since a defect in the power supply will affect all circuits, it should be checked for proper operation before proceeding to other circuits.

SUPPLY	NOMINAL VALUE	NORMAL VARIATION	NORMAL RIPPLE	WIRE COLOR*
AC Line	115V	---------	------	------
B+1	375	±15 Volts	6 to 15 volts	Red
B+2	175	±.5 Volts	12 to 25 millivolts	Blue
B+3	100	±5-10 Volts	15 millivolts to .5 volts	Orange
B-	-82	±2 Volts	100 millivolts	White
6.3 "A"	6.3V AC	Main filament supply		Green
6.3 "B"	6.3V AC	180° out of phase with supply "A". Source of phasing and filament voltages.		Gray
6.3 "C"	6.3V AC	Isolated filament voltage for tubes with cathodes above ground.		Brown

NEXT: If power supply is operating normal, use the block diagram to isolate the trouble to a major section. Check tubes, diodes, and adjustment of Front Panel and printed wiring board controls located within that section (see Page 7 for adjustment procedure). By the use of the schematic, ordinary difficulties encountered can be readily located and remedied. The following trouble-shooting chart is an additional aid to servicing:

SYMPTOM	POSSIBLE CAUSE AND REMEDIES
Pilot Light OFF and unit Fails to Operate	Fuse open - replace. If second fuse opens - look for cause of overload, shorted wiring, components, etc.
B+1 Off Value or Excessivle Ripple	Check R4, C1, C2, CR1, and CR2.
B+2 Off Value or Excessive Ripple	Check R1 for proper adjustment. Check R15, it will burn out if B+2 is overloaded. Check V1, V2, V3, tubes and circuitry.
B+3 Off Value or Excessive Ripple	Check R17 and R21 (these resistors adjust the voltage on the grid of V4, a cathode follower, which in turn determines the voltage on the cathode). Check R18 (this resistor will burn out if B+3 is overloaded). Check V4 and C2.
B- Off Value or Excessive Ripple	Check C3, C4, C5, CR3, R3, R5 and R6. Check V1 to see if it is lit properly (should be a steady orange glow).

*Wire colors do not apply to shielded wires - single wires only.

V1 Not Lit Properly	If replacing V1 and checking the above parts does not remedy the trouble, check the line voltage. Low line voltage could cause this trouble. Reducing the value of R3 slightly will usually eliminate this difficulty.
RF Output is Low or Zero	Check R314 - this resistor will burn out if the B+ to the sweep oscillator is overloaded. Check B+ to the sweep oscillator, cathode of V304. It should be a positive square wave of 25-100 volts and should vary as the OUTPUT LEVEL control varies. If it is normal, look for RF difficulties, defective tube, components, shorted or open wiring, etc. Replace mixer diodes in sweeper box, observe polarity. If the voltage is low and does not respond to the LEVEL control, remove first V303 and then V201. When either of these tubes conducts, the voltage on the grid of V304 (pin 2) is reduced and thus decreases the B+ to the sweep oscillator. If removal of V201 allows the the B+ on V304 (pin 3) to return to normal, check the blanking tube, controls, and associated circuitry. If removal of V303 causes the B+ to return to normal, check the LEVELER controls, V301 and V302, tubes, and associated circuitry.
Poor Leveling	Replace monitor diode. Also replace V301, V302, and V303. V301 is the most critical since it is in the first stage of the DC coupled amplifier. Resetting the printed circuit LEVEL controls is sometimes necessary if these tubes are replaced.
Weak Markers	Replace IN82 or IN34 crystal diode mixer. Check Birdy-By-Pass Amplifier, tubes and circuitry.
No Horizontal Output	Look for difficulty in the sawtooth circuitry V101, using the printed circuit board layout and schematic to check waveforms and voltages.

CONVERSION FOR 230 VOLT POWER LINES

The dual primary of the power transformer is normally wired in parallel for use on 115 volt AC lines. If desired, the windings can easily be reconnected in series for use with 230 volt power. With the aid of the Chassis Layout, bottom view, locate terminals 1, 2, 3, and 4. Remove the jumper wires between terminals 1 and 2 and between terminals 3 and 4. Then install a jumper wire between terminals 2 and 3.

CABINET REMOVAL

TO REMOVE TOP COVER

Remove the four #10-32 screws (A), two on each side, and pull up on the handle until the cover is clear of the front and rear panel.

TO REPLACE TOP COVER

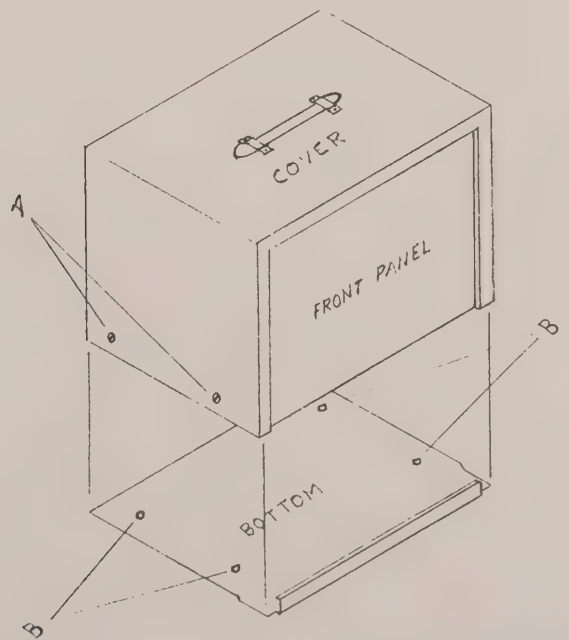
Slide cover down over front and rear panel until the holes (A) in the cover align with the threaded holes in the chassis. Insert the 10-32 screws and tighten.

TO REMOVE BOTTOM PANEL

Exerting slight pressure on screw driver turn the four screws (B) holding rubber feet to the Bottom Panel counter-clockwise until a distinct "click" is heard. After all four feet are loose, lift off entire panel. The rubber feet are captive type and remain on the Bottom Panel at all times.

TO REPLACE BOTTOM PANEL

To replace bottom panel, place in position with cam and rubber bushing of fasteners in the $\frac{1}{2}$" holes in the bottom bracket of the chassis. Turn screws clockwise until "click" is heard. This indicates the fastener is in locked position.



PART VALUE INFORMATION

SCHEMATIC PART DESIGNATION		SCHEMATIC VALUE ABBREVIATION	
C	Capacitor	Ω	Ohms
CR	Crystal Rectifier, Germanium Diode	K	1,000 ohms
F	Fuse	M	1,000,000 ohms
I	Incandescant Pilot Light		(megohms)
J	Jack or termination, Coaxial Connector	μf ,uf	Microfarad
K	Cable	μμf ,uuf	Micromicrofarad
L	Coil	μh ,uh	Microhenry
M	Meter or Motor	mh	Millihenry
P	Plug, Coaxial Connector		
R	Resistor, Fixed or Variable		
S	Switch		
T	Transformer		
V	Tube		
Z	Miscellaneous		

RESISTORS - All resistors are $\frac{1}{2}$ watt $\pm$10%, and are shown in ohms, unless otherwise specified.

NOTE: Resistors in the attenuator pads are $\pm$2%.

CAPACITORS - All capacitors are shown in micromicrofarads (uuf) unless otherwise specified.

COILS - All coils are shown in microhenries (uh) unless otherwise specified.

PARTS LOCATION - F.P. Front Panel
P.C.B. Printed Circuit Board
R.P. Rear Panel
C.H. Chassis
T.P. Test Point

PARTS NUMBERS - LOCATION INFORMATION

1 - 99 - Power Supply
101 - 199 --Horizontal and Sweep Drive Circuit
201 - 299 - Blanking
301 - 399 - Leveler
401 - 499 - Birdy-By-Pass
501 - 599 - Mixer & Plug-In Markers
601 - 699 - Variable Markers
701 - 799 - Attenuators
801 - 899 - Sweep Oscillator
901 - 999 - Modification & Special Circuits

*Indicates value of component adjusted at factory, and may deviate from value shown on print.

—○— 16 Indicates printed circuit board terminal.

N O T I C E

RED LACQUER IS USED TO INDICATE FASTENINGS THAT SHOULD NOT BE DISTURBED FOR ORDINARY SERVICE, AND TO SECURE ADJUSTABLE CONTROLS.

PARTS LIST

CIRCUIT REF.	DESCRIPTION	PART NO.
	CAPACITORS	
C1	Fixed, electrolytic, 80 uf., 250 VDCW	C-314
C2A	Fixed, electrolytic, 80 uf., 450 VDCW	C-308
C2B	Fixed, electrolytic, 20 uf., 250 VDCW	C-308
C3	Fixed, electrolytic, 30 uf., 250 VDCW	C-311
C4	Fixed, electrolytic, 30 uf., 250 VDCW	C-311
C5	Fixed, electrolytic, 30 uf., 250 VDCW	C-311
C6	Fixed, paper dielectric, .22 uf., ± 20%, 200 VDCW	C-215
C7	Fixed, paper dielectric, .22 uf., ± 20%, 400 VDCW	C-217
C8 thru C100	These circuit references not assigned.	
C101	Fixed, paper dielectric, .1 uf., ± 20%, 200 VDCW	C-203
C102	Fixed, paper dielectric, .1 uf., ± 20%, 200 VDCW	C-203
C103	Fixed, dura-mica, .0022 uf., ± 10%, 600 VDCW	C-24
C104	Fixed, paper dielectric, .01 uf., ± 20%, 600 VDCW	C-210
C105	Fixed, paper dielectric, .47 uf., ± 20%, 200 VDCW	C-216
C106 thru C200	These circuit references not assigned.	
C201	Fixed, paper dielectric, .1 uf., ± 20%, 200 VDCW	C-203
C202	Fixed, paper dielectric, .1 uf., ± 20%, 200 VDCW	C-203
C203 thru C300	These circuit references not assigned	
C301	Fixed, ceramic disc, .01 uf., GMV 600 V	C-20

CIRCUIT REF.	DESCRIPTION	PART NO.
	CAPACITORS CONT.	
C302	Fixed, ceramic disc, 50uuf., ± 10%, NPO, 1000 VDCW	C-11
C303	Fixed, ceramic disc, 33uuf., ±10%, NPO, 1000 VDCW (this part subject to change)	C-10
C304	Fixed, ceramic disc, .01 uf., GMV, 600 VDCW	C-20
C305 thru C400	These circuit references not assigned	
C401	Fixed, ceramic, disc, 120 uuf., ± 10%, 600 VDCW, N750	C-14
C402	Fixed, ceramic disc, .01 uf., GMV, 600 VDCW	C-20
C403	Fixed, ceramic disc, .01 uf., GMV, 600 VDCW	C-20
C404	Fixed, ceramic disc, .01 uf., GMV, 600 VDCW	C-20
C405	Fixed, ceramic disc, 1000 uuf, GMV, 600 VDCW	C-19
C406	Fixed, ceramic disc, 1000 uuf, GMV, 600 VDCW	C-19
C407	Fixed, ceramic disc, .01 uf., GMV, 600 VDCW	C-20
C408 thru C500	These circuit references not assigned.	
C501	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C502 thru C800	These circuit references not assigned.	
C801	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C802	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C803	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C804	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C805	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39

CIRCUIT REF.	DESCRIPTION	PART NO.
	CAPACITORS CONT.	
C806	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C807	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C808	Fixed, solder-in, ceramic disc, 4 uuf., ± 5%, NPO, 500 VDCW	C-41
C809	Fixed, solder-in, ceramic disc, 3 uuf., ± 5%, NPO, 500 VDCW	C-40
C810	Fixed, composition, .5 uuf., ± 10%, 500 VDCW	C-29
C811	Fixed, mica, 600 uuf	
C812	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C813	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C814	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C815	Fixed, ceramic, feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C816	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C817	Fixed, ceramic feedthru, 1000 uuf., GMV, 500 VDCW	C-39
C818	Fixed, composition, 4 uuf., ± 10%, 500 VDCW	C-35
C819	Fixed, ceramic disc, .01 uf., GMV, 600 VDCW	C-20
	RECTIFIERS	
CR1	Silicon, Sarkes Tarzian Type 40K	D-5
CR2	Silicon, Sarkes Tarzian Type 40K	D-5
CR3	Silicon, Sarkes Tarzian Type 40K	D-5

CR4 thru CR500 These circuit references not assigned.

CIRCUIT REF.	DESCRIPTION	PART NO.
	RECTIFIERS CONT.	
CR501	Crystal Diode, IN82	D-1
CR502 thru CR800	These Circuit references not assigned.	
CR801	Crystal Diode, IN21	D-4
CR802	Crystal Diode, IN82	D-1
CR803	Crystal Diode, IN82	D-1
CR804	Crystal Diode, IN82	D-1
CR805	Crystal Diode, IN82	D-1
	FUSE	
F1	3AG, 2 amp. 250 V	MP-6
	LAMP	
I1	Incandescent, #47 6-8 V	MP-5
	BNC JACKS & TERMINATORS	
J101	Jack, receptacle, BNC Dage type 2545-1	J-10
J102 thru J400	These circuit references not assigned.	
J401	Jack, receptacle, BNC Dage type 2545-1	J-10
J402	Jack, Receptacle, BNC Dage Type 2545-1	J-10
J403 thru J500	These circuit references not assigned.	
J501	Terminator, cable, MX1684/U	J-9
J502 & J503	These circuit references not assigned.	
J504	Terminator, cable, MX1684/U	J-9
J505	Jack, cable, Dage 2559-1	J-11
J506 thru J700	These circuit references not assigned.	

CIRCUIT REF.	DESCRIPTION	PART NO.
	BNC JACKS & TERMINATORS CONT.	
J701	Jack, receptacle, flange mounted	J-21
J702	Jack, receptacle, flange mounted	J-21
J703	Jack, cable, Dage 2559-1	J-11
J704 thru J800	These circuit references not assigned.	
J801	Jack, receptacle, flange mounted, UG-185/U	J-3
J802	Jack, receptacle, right angle, flange mounted, UG535/U	J-6
J803	Jack, receptacle, flange mounted, UG-185/U	J-3
J804	Jack, receptacle, (Part of lo-pass filter)	
J805	Terminator, Cable, MX1684/U	J-9
J806	Terminator, Cable, MX1684/U	J-9
	COIL	
L401	Adjustable, 10 mh	L-23
L402 thru L800	These circuit references not assigned.	
L801	Fixed, .3 uh	L-104
L802	Fixed, 2.2 uh	L-101
L803	Fixed, 2.2 uh	L-101
L804	Fixed, 2.2 uh	L-100
L805	Fixed .68 uh	L-103
L806	Shunt, Inductance Loop	
L807	Fixed, .3 uh	L-104
L808	Fixed, 2.2 uh	L-101
L809	Fixed, 2.2 uh	L-101
L810	Fixed, .68 uh	L-103

CIRCUIT REF.	DESCRIPTION	PART NO.
L811	Coupling, Inductance Loop	
L812	Tuning Line, Inductance Loop	
L813	Tuning Line, Inductance Loop	
	BNC PLUGS	
P701	Cable, UG88/U	J-1
P702	Cable, UG88/U	J-1
P703 thru P800	These circuit references not assigned.	
P801	Cable, UG88/U	J-1
P802	Cable, UG88/U	J-1
P803	Cable, UG88/U	J-1
P804	Cable, UG88/U	J-1
	RESISTORS	
R1	Variable, composition, 50K ohms, $\frac{1}{4}$W	R-725
R2	Variable, wirewound, 25 ohms, 2W	R-713
R3	Fixed, wirewound, 10K ohms, ±10%, 5W	R-404
R4	Fixed, composition, 4.7 ohms, ±10%, 1W	R-206
R5	Fixed, composition, 4.7K ohms, ±10%, 2W	R-306
R6	Fixed, composition, 1K ohms, ±10%, 1W	R-208
R7	Fixed, composition, 4.7 ohms, ±10%, 1W	R-206
R8	Fixed, composition, 47K ohms, ±10%, $\frac{1}{2}$W	R-27
R9	Fixed, composition, 47K ohms, ±10%, 2W	R-305
R10	Fixed, composition, 100K ohms, ±10%, 2W	R-303
R11	Fixed, composition, 1M ohms, ±10%, $\frac{1}{2}$W	R-31
R12	Fixed, composition, 22 ohms, ±10%, $\frac{1}{2}$W	R-11
R13	Fixed, composition, 27K ohms, ±10%, 2W	R-304

CIRCUIT REF.	DESCRIPTION	PART NO.
R14	Fixed, composition, 180K ohms, ±10%, ½W	R-45
R15	Fixed, composition, 100 ohms, ±-10%, ½W	R-15
R16	Fixed, composition, 100 ohms, ± 10%, ½W	R-15
R17	Fixed, composition, 220K ohms, ±10%, ½W	R-44
R18	Fixed, composition, 100 ohms, ±10% , ½W	R-15
R19	Fixed, composition, 100 ohms, ±10%, ½W	R-15
R20	Fixed, composition, 220K ohms, ±10%, ½W	R-44
R21	Fixed, composition, 220K ohms, ±10%, ½W	R-44
R22	Fixed, composition, 220K ohms, ±10%, ½W	R-44
R23	Fixed, composition, 220K ohms, ±10%, ½W	R-44
R24 thru R100	These circuit references not assigned.	
R101	Variable, composition, 200K ohms, ¼W	R-724
R102	Variable, composition, 2M ohms, ¼W	R-729
R103	Variable, composition, 100K ohms, ¼W	R-732
R104	Fixed, composition, 2.2K ohms, ±10%, ½W (this part subject to change)	R-20
R105	Fixed, composition, 47K ohms, ±10%, ½W	R-27
R106	Fixed, composition, 560K ohms, ±10%, ½W	R-29
R107	Fixed, composition, 1M ohms, ±10%, ½W	R-31
R108	Variable, composition, 100K ohms, ¼W (ganged with R801)	R-731
R109	Fixed, composition, 27K ohms, ±10%, ½W (this part subject to change)	R-25
R110	Fixed, composition, 220K ohms, ±10%, ½W	R-44
R111	This circuit reference not assigned.	
R112	Fixed, composition, 7.5 ohms, ±5%, 5W	R-403
R113 thru R200	These circuit references not assigned.	

CIRCUIT REF.	DESCRIPTION	PART NO.
R201	Variable, composition, 200K ohms, $\frac{1}{4}$W	R-724
R202	Variable, composition, 1M ohms, $\frac{1}{4}$W	R-728
R203	Fixed, composition, 560K ohms, $\pm$10%, $\frac{1}{2}$W	R-29
R204	Fixed, composition, 560K ohms, $\pm$10%, $\frac{1}{2}$W	R-29
R205	Fixed, composition, 560K ohms, $\pm$10%, $\frac{1}{2}$W	R-29
R206	Fixed, composition, 560K ohms, $\pm$10%, $\frac{1}{2}$W	R-29
R207 thru R300	These circuit references not assigned.	
R301	Variable, composition, 50K ohms, $\frac{1}{4}$W	R-725
R302	Variable, composition, 50K ohms, $\frac{1}{4}$W	R-725
R303	Variable, composition, 200K ohms, $\frac{1}{2}$W	R-707
R304	Fixed, composition, 560K ohms, $\pm$10%, $\frac{1}{2}$W	R-29
R305	Fixed, composition, 10K ohms, $\pm$10%, $\frac{1}{2}$W	R-23
R306	Fixed, composition, 1M ohms, $\pm$10%, $\frac{1}{2}$W	R-31
R307	Fixed, composition, 47K ohms, $\pm$10%, $\frac{1}{2}$W	R-27
R308	Fixed, composition, 680K ohms, $\pm$10%, $\frac{1}{2}$W	R-30
R309	Fixed, composition, 10K ohms, $\pm$10%, $\frac{1}{2}$W	R-23
R310	Fixed, composition, 39K ohms, $\pm$10%, $\frac{1}{2}$W	R-26
R311	Fixed, composition, 100K ohms, $\pm$10%, $\frac{1}{2}$W	R-28
R312	Fixed, composition, 10K ohms, $\pm$10%, $\frac{1}{2}$W	R-23
R313	Fixed, composition, 1M ohms, $\pm$10%, $\frac{1}{2}$W	R-31
R314	Fixed, composition, 82 ohms, $\pm$5%, $\frac{1}{2}$W	R-86
R315	Fixed, composition, 100 ohms, $\pm$10%, $\frac{1}{2}$W	R-15
R316	Fixed, composition, 100 ohms, $\pm$10%, $\frac{1}{2}$W	R-15
R317 thru R300	These circuit references not assigned.	
R401	Fixed, composition, 47K ohms, $\pm$10%, $\frac{1}{2}$W	R-27

CIRCUIT REF:	DESCRIPTION	PART NO.
R402	Fixed, composition, 100K ohms, ±10%, ½W	R-28
R403	Fixed, composition, 4.7K ohms, ±10%, ½W	R-21
R404	Fixed, composition, 47K ohms, ±10%, ½W	R-27
R405	Variable, composition, 100K ohms, ½W	R-705
R406	Fixed, composition, 10K ohms, ±10%, ½W	R-23
R407	This circuit reference not assigned.	
R408	Variable, composition, 100K ohms, ½W	R-705
R409	Fixed, composition, 68K ohms, ±10%, ½W	R-51
R410	Fixed, composition, 100 ohms, ±10%, ½W	R-15
R411	Fixed, composition, 10K ohms, ±10%, ½W	R-23
R412	Fixed, composition, 100 ohms, ±10%, ½W	R-15
R413	Fixed, composition, 10K ohms, ±10%, ½W	R-23
R414	Fixed, composition, 100 ohms, ±10%, ½W	R-15
R415	Fixed, composition, 10K ohms, ±10%, ½W	R-23
R416 thru R500	These circuit references not assigned.	
R501	Fixed, composition, 220 ohms, ±10%, ½W	R-39
R502	Fixed, composition, 470 ohms, ±10%, ½W	R-42
R503	Fixed, composition, 56 ohms, ±5%, ½W	R-53
R504	Fixed, composition, 56 ohms, ±5%, ½W	R-53
R505 thru R800	These circuit references not assigned.	
R801	Variable, wirewound, 20 ohms, 2W (ganged to R108)	R-731
R802	Variable, wirewound, 20 ohms, 2W (ganged to R801)	R-731
R803	Variable, wirewound, 25 ohms, 2W	R-713

CIRCUIT REF.	DESCRIPTION	PART NO.
R804	Fixed, composition, 22 ohms, ±10%, 2W	R-309
R805	Fixed, composition, 330 ohms, ±10%, ½W	R-17
R806	Fixed, composition, 18 ohms, ±10%, ½W	R-78
R807	Fixed, composition, 300 ohms, ±5%, ½W	R-77
R808	Fixed, composition, 300 ohms ±5%, ½W	R-77
R809	Fixed, composition, 120 ohms, ±10%, ½W	R-16
R810	Fixed, composition, 5600 ohms, ±10%, ½W	R-22
R811	Fixed, composition, 180 ohms, ±10%, ½W	R-52
R812	Fixed, composition, 120 ohms, ±10%, ½W	R-16
R813	Fixed, composition, 4700 ohms, ±10%, ½W	R-21
	SWITCHES	
S1	Toggle, SPST	SW-10
	TRANSFORMER	
T1	Power	T-10A
	TUBES	
V1	Electronic: 5651 (Voltage Regulator)	VT-17
V2	Electronic: 6AU6	VT-5
V3	Electronic: EL84/6BQ5	VT-16
V4	Electronic: E184/6BQ5	VT-16
V5 thru V100	These circuit references not assigned.	
V101	Electronic: 12AX7	VT-13
V102 thru V200	These citcuit references not assigned.	
V201	Electronic: 12AX7	VT-13

CIRCUIT REF.	DESCRIPTION	PART NO.
V202 thru V300	These circuit references not assigned.	
V301	Electronic: 6AU6	VT-5
V302	Electronic: 12AX7	VT-13
V303	Electronic: 6AU6	VT-5
V304	Electronic: EL84/6BQ5	VT-16
V305 thru V400	These circuit references not assigned.	
V401	Electronic: 12AX7	VT-13
V402	Electronic: 12AX7	VT-13
V403 thru V800	These circuit references not assigned.	
V801	Electronic: 6AF4	VT-4
V802	Electronic: 6AF4	VT-4
	MISCELLANEOUS	
Z701	Attenuator, turret	TA-50
Z801	Wobbulator	Not Assigned
Z802	Wobbulator	Not Assigned
	Bushing, AC line cord strain relief	H-23
	Bushing, tuning shaft ground	SM-11
	Cord, AC line	W-6
	Feet, Cabinet	H-30 Assembly
	Filter, Low pass	Not Assigned
	Fuseholder	MP-31
	Handle, Cabinet	H-20
	Knob, Bar: attenuator	K-5
	Knob, round 2"	K-1

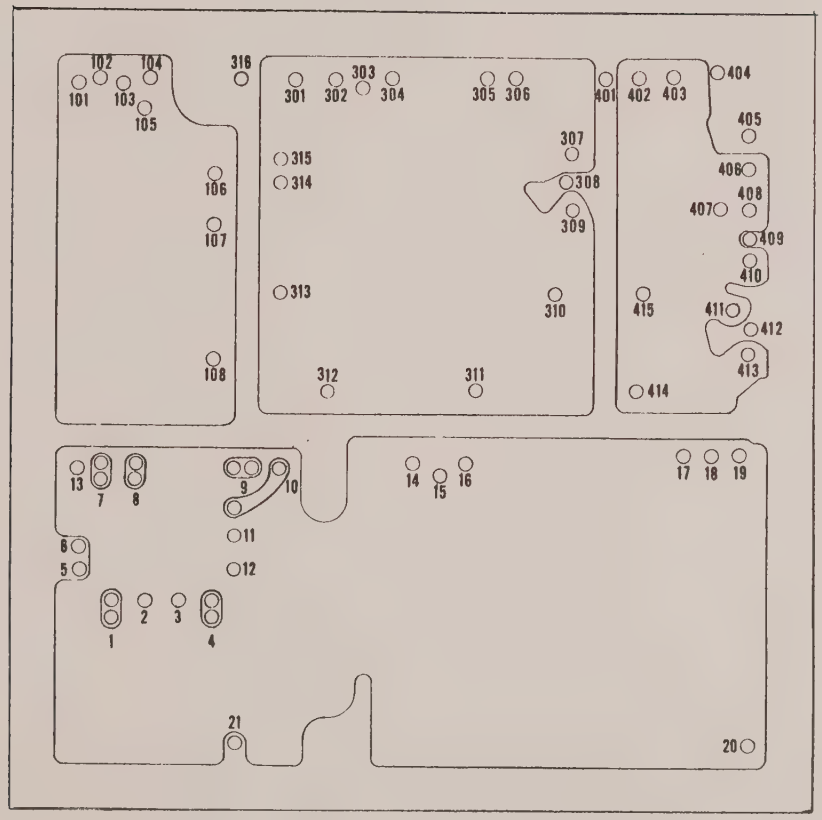
PARTS LIST

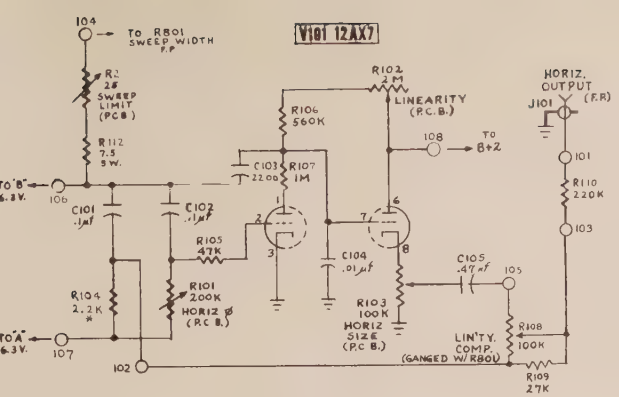
CIRCUIT REF.	DESCRIPTION	PART NO.
	Knob, round 5/8"	K-4
	Nib, tuning	SM-2
	Socket, Diode	S-9
	Socket, 7 pin mica filled	S-7
	Socket, 7 pin printed circuit	S-4
	Socket, 9 pin printed circuit	S-5
	Socket Assembly, Pilot Light	MP-3
	Tuning Line Assembly	Not Assigned

CHASSIS LAYOUT

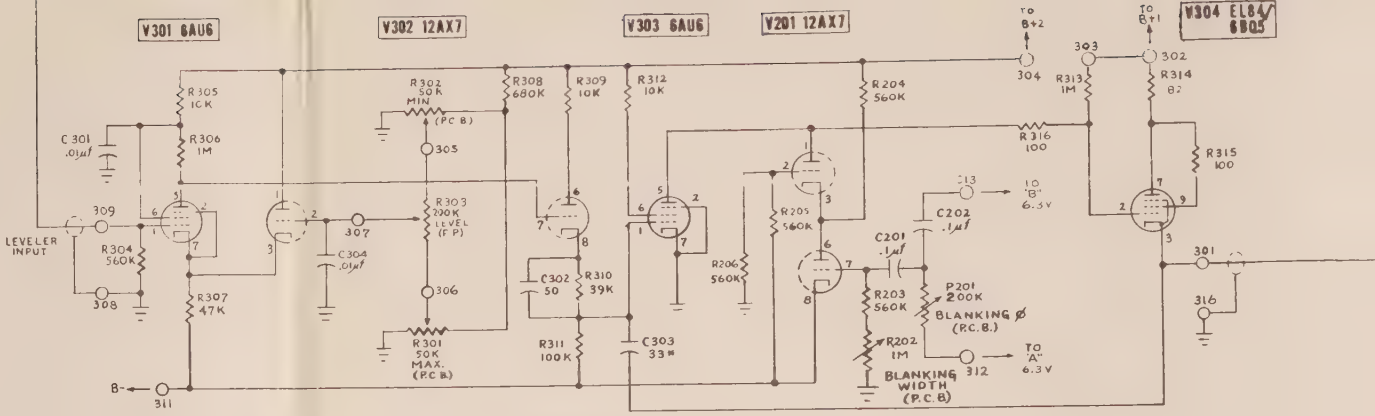
BOTTOM VIEW

TERMINALS

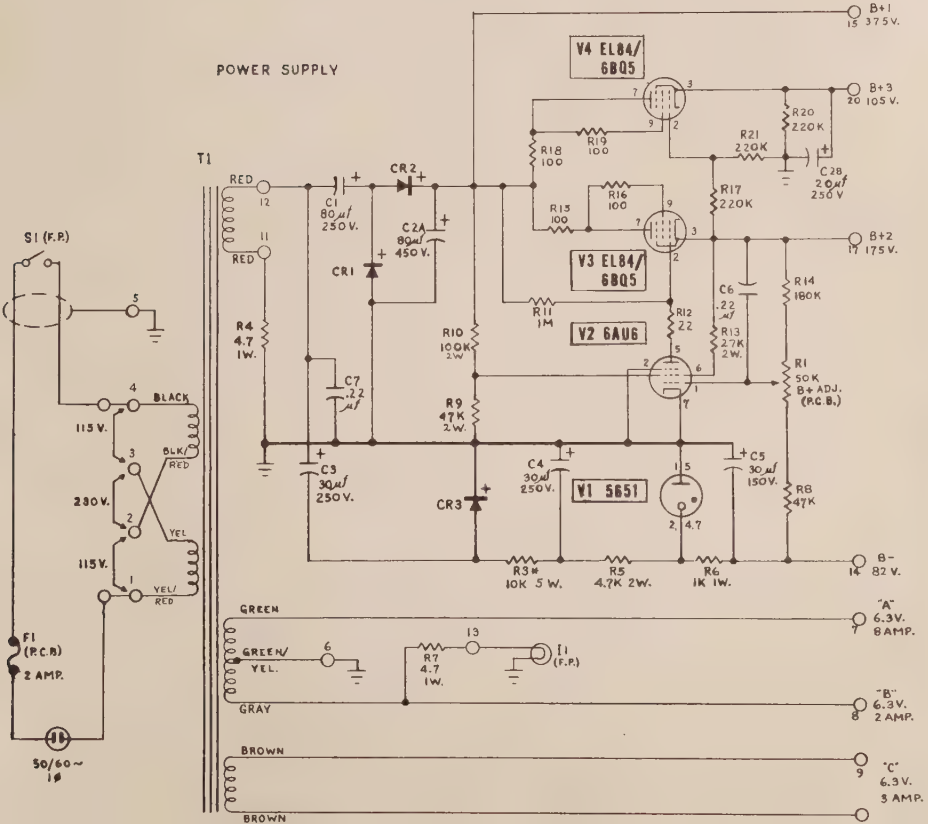


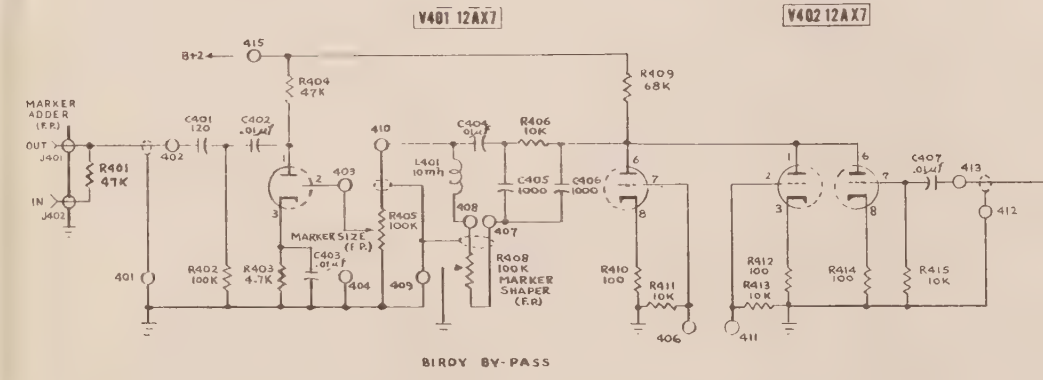


HORIZONTAL AND SWEEP DRIVE



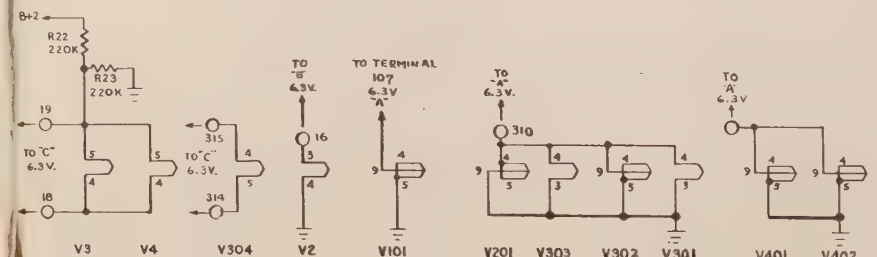
LEVELER AND BLANKING

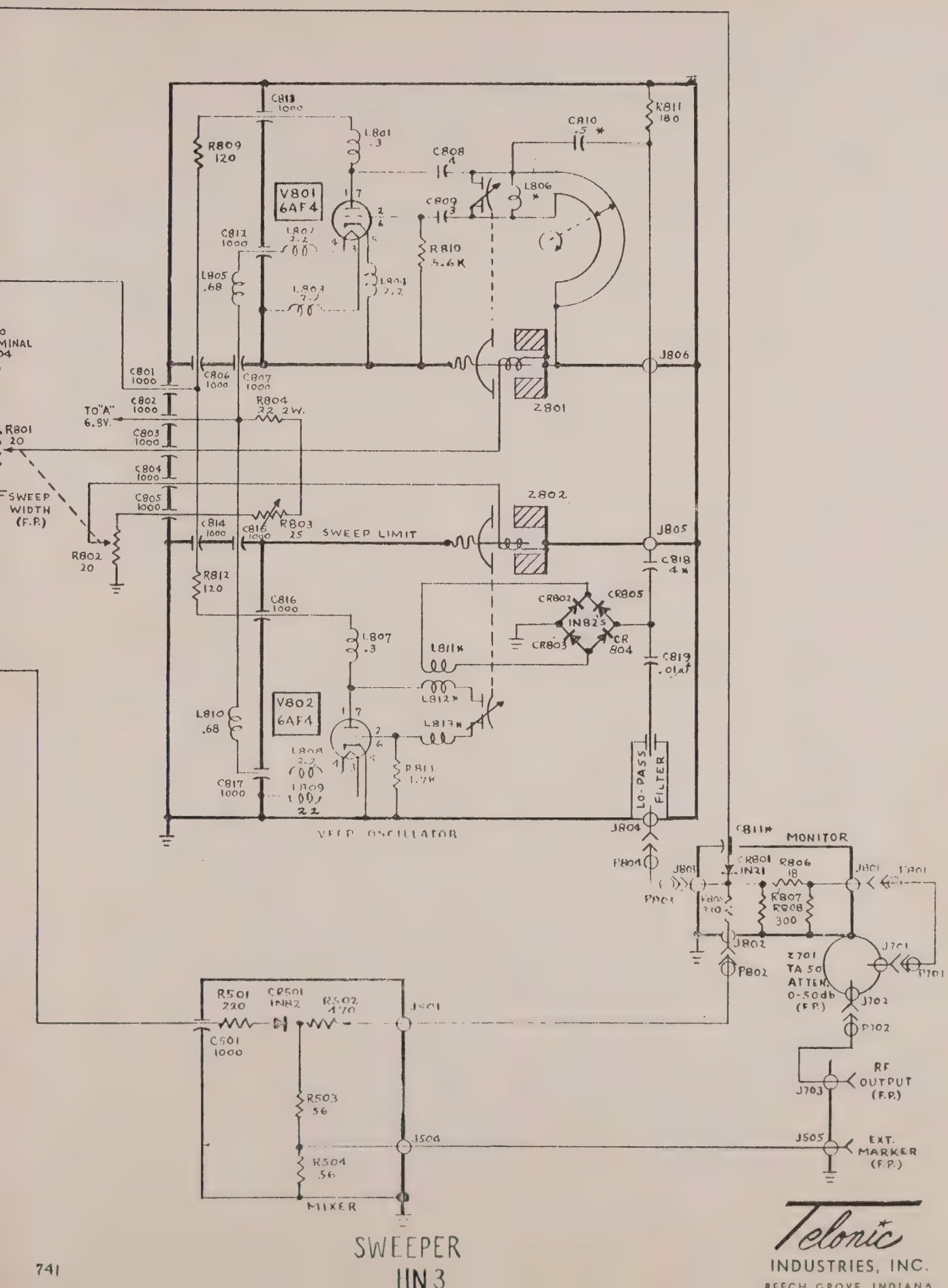




BIROY BY-PASS

NOTE: B+3 TERMINAL 20, AND MARKER INPUTS, TERMINALS 406 & 411 DO NOT PERFORM ANY FUNCTION ON THIS UNIT.





SWEEPER

IN 3

741

Telonic INDUSTRIES, INC.

BEECH GROVE, INDIANA

WARRANTY

TELONIC INSTRUMENTS AND ACCESSORIES

Products manufactured by TELONIC INDUSTRIES, INC. are guaranteed against defective materials and workmanship for a period of one year (vacuum tubes excepted) from date of purchase. This warranty does not apply to instruments that have been altered, improperly handled or damaged in any way beyond our control.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

RETURNING EQUIPMENT TO FACTORY

Factory service is available for repair and readjustment of this instrument. However, a description of the trouble, plus the MODEL AND SERIAL NUMBERS of the unit should be forwarded FIRST, whereupon instructions for correcting the trouble OR authorization for returning the equipment will be given. This applies to all units, whether under warranty or not.

Telonic®

SWEEP GENERATORS

CATALOG 8-B

for precise measurement of frequency response . . .

. . . in the laboratory

. . . on the production line

- *Sweep Generators*
- *Marker Equipment*
- *RF Attenuators*
- *RF Detectors*
- *RF Filters*

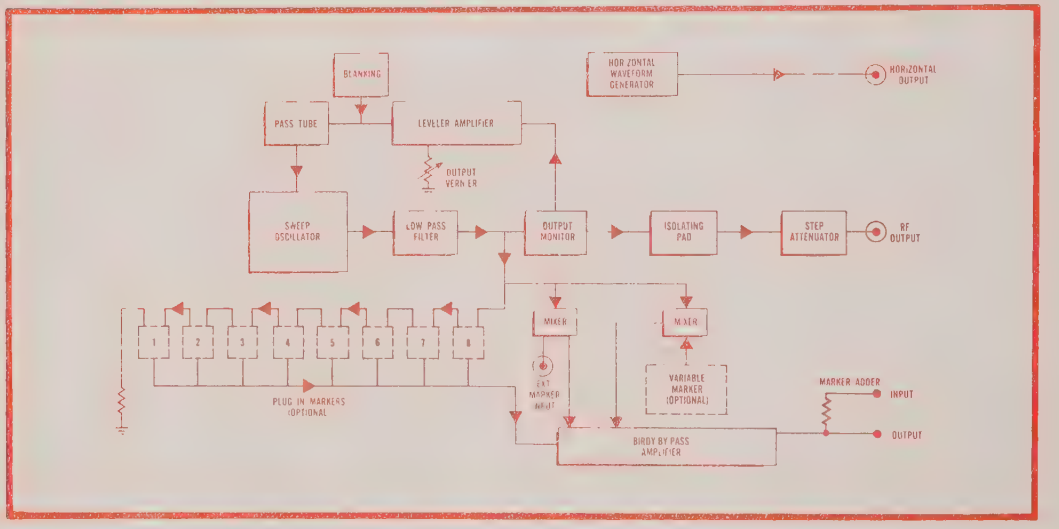
Telonic INDUSTRIES, INC. BEECH GROVE, INDIANA

Telonic SWEEP GENERATORS

The ultimate check on RF circuit quality is frequency response. Telonic Sweep Generators permit accurate, rapid measurements of frequency response under both laboratory and production-line conditions.

A Telonic Sweep Generator scans the entire frequency range in a 60th of a second, replacing the tedious point-to-point testing normally required. At the same time, the amplitude of the swept signal is precisely controlled to produce a constant voltage input to the circuit under test.

The circuit output is normally demodulated and presented as a continuous oscilloscope trace. Precision attenuators allow quantitative measurements of the results. Internal and external markers provide automatic frequency calibration. Telonic Sweep Generators may be used to perform rapid frequency-response tests on filters, mixers, amplifiers, and a wide variety of other RF circuits.



BLOCK DIAGRAM FOR TYPICAL TELONIC SWEEP GENERATOR

ACCURATE MEASUREMENTS

The heart of every Telonic Sweep Generator is a vacuum-tube oscillator. The frequency of this oscillator is swept through the desired range by a modulator consisting of either a saturated ferrite core or a precision vibrating capacitor. A sawtooth voltage is provided for connection to the horizontal input of the oscilloscope. This waveform is in phase with the swept signal and provides the "X" axis value of the instantaneous amplitude versus frequency graph appearing on the oscilloscope. The oscillator is cut-off during the return sweep providing a flat base line on the oscilloscope for quantitative measurements.

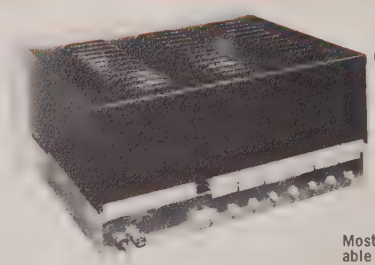
In point-to-point frequency response determinations, the power of a standard type signal generator must be adjusted each time a new frequency is selected. A Telonic Sweep Generator makes this adjustment automatically and continuously. An electronic regulator maintains the power output of the oscillator circuit at a constant level.

Accurate toggle switch or turret attenuators reduce the power input to the circuit under test by precisely known amounts. These attenuators have been especially designed for flat frequency response across the range being measured. Frequency markers are superimposed on the signal trace (see last page) *after* it has passed through the circuit under test and has been detected, preventing any distortion in the amplitude measurement.

PHYSICAL DESCRIPTION

Panel — ⅛" x 8¾" x 19"
Chassis — 2" x 14½" x 17"

Bench models are enclosed in a hinged top grey and black satin cabinet.



For rack mounting, bench models are enclosed by dust covers and finished in flat black enamel.

Most bench models are also available in portable cabinets. Provisions are included for adding up to eight plug-in markers.

GENERAL SPECIFICATIONS

(Generally applicable to Telonic Sweep Generators)

Flatness..... 5%
Zero Base Line.....Oscillator off during return sweep
Sweep Rate.....Line frequency (50-60 cps)
Horizontal Sweep.....20 volts
Vernier Attenuation.....0-10 db.

Power.....115 v. 50/60 cycle, approx. 120 watts
Display Linearity.....Better than 1.2:1
Radiation.....Less than 10 microvolts
Source VSWR.....Below 1.2:1
Markers.....Birdy-By-Pass Marker System

Variable Markers.....Available on LD, LR, SD & ED Models

Model	Center Frequency	Sweep Width	Range	Attenuation (db) (T) Turret (S) Toggle Switch	Output (into 50 ohms)	Remarks	Bulletin Number
HD-1A	1-400 mc 400-900 mc	200kc-200 mc 0-10%	1-910 mc	T-0, 10, 20, 30, 40, 50	.75, p to p 2V p to p	Lo band heterodyne Hi band fundamental	T-209
HD-3	1-200 mc	200kc-200 mc	1-300 mc	T-0, 10, 20, 30, 40, 50	.75 p to p	Heterodyne type — wide sweep width and tunable center frequency	T-210
HD-4	10kc-10 mc	25kc-10 mc	10kc-15 mc	S-20, 20, 20, 10, 6, 3	1V, p to p	Video sweep — wide or narrow applications	T-213
HD-7	100kc-75 mc	250kc-50 mc	100kc-100 mc	S-20, 20, 20, 10, 6, 3	1V, p to p	Video and IF frequencies Higher video and IF frequencies	
LD-3	4-15 mc	.05-40% of CF	3.5-17.5 mc	S-20, 20, 20, 20, 20, 10, 5, 3, 2, 1	1uV-1V, RMS	Electronically swept • Fundamental frequency type • Wide range of output levels • Exceptionally stable, flat and free from spurious content	T-214
LD-4	10-35 mc	.05-40% of CF	9-40 mc				
LD-5	20-75 mc	.05-40% of CF	16-90 mc				
LD-6	50-125 mc	.05-30% of CF	45-140 mc				
LR-3	4-15 mc	.05-40% of CF	3.5-17.5 mc	S-20, 20, 20, 20, 20, 10, 5, 3, 2, 1	1uV-1V, RMS	Similar to LD models, but includes variable sweep rate of .01 to 100cps and other features. For testing narrow band devices, crystal filters, etc.	T-215
LR-4	10-35 mc	.05-40% of CF	9-40 mc				
LR-5	20-75 mc	.05-40% of CF	16-90 mc				
LR-6	50-125 mc	.05-30% of CF	45-140 mc				
SD-1	100-220 mc	.05-30% of CF	85-235 mc	T-0, 10, 20, 30, 40, 50	1V, RMS	Capacitive sweep Center frequency tuning Exceptionally flat VHF — UHF — low microwave applications	T-207
SD-2	215-450 mc	.02-10% of CF	200-460 mc	T-0, 10, 20, 30, 40, 50	1V, RMS		
SD-3	440-920 mc	.01-6% of CF	425-930 mc	T-0, 10, 20, 30, 40, 50	1V, RMS		
SD-4	950-1250 mc	.01-4% of CF	925-1260 mc	T-0, 10, 20, 30, 40, 50	1V, RMS		
SD-200		180 mc	260-440 mc	T-0, 10, 20, 30, 40, 50	Over 1V, RMS	Capacitive sweep Fixed tuned Exceptionally wide, flat sweep Wide band applications UHF and microwave	
SD-201		175 mc	325-500 mc	T-0, 10, 20, 30, 40, 50	Over 1V, RMS		
SD-202		250 mc	500-750 mc	T-0, 10, 20, 30, 40, 50	Over 1V, RMS		
SD-203		300 mc	650-950 mc	T-0, 10, 20, 30, 40, 50	Over 1V, RMS		
SD-204		400 mc	800-1200 mc	T-0, 10, 20, 30, 40, 50	1V, RMS		
SD-205		350 mc	900-1250 mc	T-0, 10, 20, 30, 40, 50	1V, RMS		
SD-206		200 mc	1200-1400 mc	T-0, 10, 20, 30, 40, 50	1V, RMS		
ED-1	1000-1500 mc	.25-100 mc	975-1515 mc	Vernier 0-10db	.25VRMS	Output is result of 2nd harmonic generation and filtering — and thus these ranges are obtained from the highly reliable SD type of oscillator	T-216
ED-2	1400-1900 mc	.25-100 mc	1350-1920 mc				
ED-3	1500-2000 mc	.25-100 mc	1475-2020 mc				
ED-4	1700-2300 mc	.25-100 mc	1675-2320 mc				
ED-201		500 mc	1000-1500 mc	Vernier 0-10db	.25VRMS	Same as above but with fixed width and center frequency	
ED-202		500 mc	1400-1900 mc				
ED-203		500 mc	1500-2000 mc				
ED-204		500 mc	1700-2300 mc				
PD-1	5-50 mc	0-20%	4.2-53 mc	Vernier 0-10db	15VRMS into 50 ohms (4-5 watts)	HI POWER SWEEP Generator excellent for FILTER and RF transmission line and antenna testing	T-217
PD-2	20-100 mc	0-20%	17-105 mc				
PD-3	100-250 mc	0-20%	85-260 mc				
PD-4	250-500 mc	0-20%	210-520 mc				
PD-5	300-600 mc	0-20%	250-625 mc				
PD-6	500-1000 mc	0-15%	450-1010 mc				

T-206

SSX-2 Series — Available in ranges from 1 mc to over 100 mc. Similar to LD models but includes: CW, mod. CW, pulsed CW, variable marker and other features. Ideal for IF amplifier testing.

BULLETIN No. T-206

T-208

302 and 303 Test Sets — Instruments now being used for testing missile and radar IF systems — engineering, production and included as ground support equipment.

BULLETIN No. T-208

T-203A

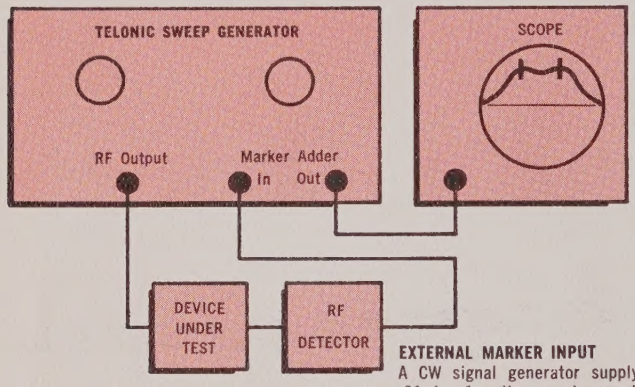
VHF and UHF TV Production Sweep Generators — Telonic Sweep Generators are used universally by almost every television manufacturer in the United States and overseas. Numerous models with unique features and special accessories are available.

BULLETIN No. T-203-A

BIRDY-BY-PASS MARKER SYSTEM

In this system, beat or birdy pips are produced by mixing a sample of the sweep oscillator signal with the marker output. The "birdies" are fed through an amplifier and are added to the demodulated sweep signal before it is connected to the scope vertical amplifier. The markers completely bypass the device under test.

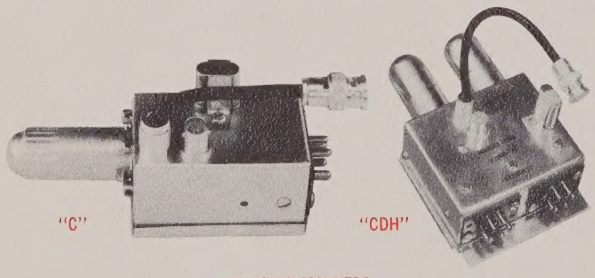
Since the markers are produced directly, no frequency error can occur other than in the marker oscillator itself. In addition to accuracy it features — stability, versatility and simplicity.



EXTERNAL MARKER INPUT
A CW signal generator supplying .01 to .1 volts may be used to produce a variable marker.

Eight plug-in sockets are included on the chassis of the HD, LD, SD, LR and ED Sweep Generators. Eight ON/OFF switches are also mounted on the front panel. This permits mounting up to eight of the "C" and "CH" type markers, up to four "CDH" type, or a combination of the plug-in types.

The "C" unit makes use of crystals up to 60 mc and generates a *single* marker by use of frequency selective circuits that combine the approximate harmonic with the swept signal sample in a diode mixer. Single markers can be produced to as high as 1250 mc.



PLUG-IN MARKERS

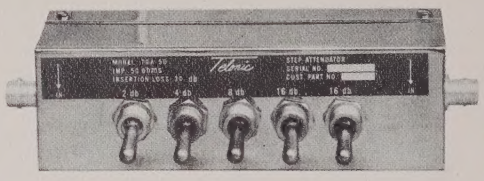
The selective circuits of the "C" unit are omitted in the "CH" units; thus a marker is produced at each harmonic of the crystal. The amplitude of the harmonics decrease therefore limiting the usefullness of the "CH" units to between the 10th or 15th harmonic.

The "CDH" circuit includes two dual triodes to greatly extend the range of harmonics. These units maintain a relatively constant level to as high as the 200th harmonic. Crystal frequencies of from 0.5 to 10 mc are normally used. Since an untuned type of oscillator circuit is used, frequency depends solely upon the crystal used.

BULLETIN No. T-218

RF ATTENUATORS

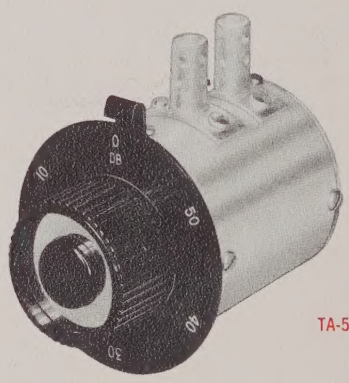
Telonic RF Attenuators are available in two forms: toggle switch and turret. The toggle switch type is recommended in the frequency range, 0-250 mc. Turret attenuators may be used to 1,250 mc. Connectors are BNC type.



TGA-50 STEP ATTENUATOR

Toggle Switch Attenuators are supplied in standard models containing 3 to 11 steps, with 0.5 to 30 db attenuation per step. Resistor accuracies may be selected at 0.5, 1, or 2%; impedances at 50, 75, or 93 ohms. A 3-step unit measures 1¾" by 1¾" by 3½". Additional steps add ¾ inch for each.

BULLETIN No. T-201



TA-50 TURRET ATTENUATOR

THE TELONIC MODEL TA-50 TURRET ATTENUATOR is a highly accurate, six-position unit providing 0, 10, 20, 30, 40 and 50 db attenuation of RF signals from DC to 900 mc and above.

Other Telonic Turret Attenuators are available that provide accurate attenuation in the 0-5, 0-10 and 0-25 db ranges.

BULLETIN No. T-212

XD-3 RF DETECTOR

Telonic RF Detectors are used whenever the circuit under test lacks "built-in" demodulation or "look" points. The Telonic RF Detectors are available in a wide range of impedance values. The complete unit includes a termination resistance, an easily replaced crystal diode, and a low pass filter to remove RF from the DC output.

Model XD-3 is a 1-1250 mc detector generally recommended for use with the HD-1, HD-3 and SD Telonic Sweep Generators. Model XD-8 is recommended for use with the HD-4, HD-7 and LD Telonic Sweep Generators, and in all applications involving the frequency range 1-250 mc.

BULLETIN No. T-204

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